

REMARKS

This communication responds to the Office Action dated September 21, 2009. No claims are amended, no claims are canceled, and no claims are added. As a result, claims 1-15 are now pending in this Application.

§ 103 Rejection of the Claims

Claims 1-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Haitsma et al. (U.S. Pat. No. 7,549,052; hereinafter “Haitsma”) in view of Pareira et al. (*Template Based Recovery of Fourier Based Watermarks Using Log Polar and Log-Log Maps*; hereinafter “Pareira”). However, since a *prima facie* case of obviousness has not been properly established by the Office, the Applicant respectfully traverses this rejection of claims 1-15.

1) *The Applicable Law*

The Examiner has the burden under 35 U.S.C. § 103 to establish a *prima facie* case of obviousness. *In re Fine*, 837 F.2d 1071, 1074, 5 U.S.P.Q.2d (BNA) 1596, 1598 (Fed. Cir. 1988). As discussed in *KSR International Co. v. Teleflex Inc. et al.* (U.S. 2007), the determination of obviousness under 35 U.S.C. § 103 is a legal conclusion based on factual evidence. *See Princeton Biochemicals, Inc. v. Beckman Coulter, Inc.*, 7, 1336-37 (Fed. Cir. 2005). The legal conclusion, that a claim is obvious within § 103(a), depends on at least four underlying factual issues set forth in *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17 (1966): (1) the scope and content of the prior art; (2) differences between the prior art and the claims at issue; (3) the level of ordinary skill in the pertinent art; and (4) evaluation of any relevant secondary considerations.

The *KSR* Court further held that “rejections on obviousness grounds cannot be sustained by mere conclusory statements; instead, there must be some articulated reasoning with some rational underpinning to support the legal conclusion of obviousness.” (*See In re Kahn*, 441 F. 3d 977, 988 (CA Fed. 2006) cited with approval in *KSR Int’l v. Teleflex Inc.*, 127 S. Ct. 1727, 1740-41 (2007)).

Therefore, the Examiner must, as one of the inquiries pertinent to any obviousness inquiry under 35 U.S.C. §103, recognize and consider not only the similarities but also the critical differences between the claimed invention and the prior art. (*In re Bond*, 910 F.2d 831,834, 15 USPQ2d 1566, 1568 (Fed. Cir. 1990), *reh'g denied*, 1990 U.S. App. LEXIS 19971 (Fed. Cir.1990)). Critical differences in the prior art must be recognized (when attempting to combine references). (*In re Bond*, 910 F.2d 831,834, 15 USPQ2d 1566, 1568 (Fed. Cir. 1990), *reh'g denied*, 1990 U.S. App. LEXIS 19971 (Fed. Cir.1990).)

Moreover, the fact that a reference teaches away from a claimed invention is highly probative that the reference would not have rendered the claimed invention obvious to one of ordinary skill in the art. (*Stranco Inc. v. Atlantes Chemical Systems, Inc.*, 15 USPQ2d 1704, 1713 (Tex. 1990).) When the prior art teaches away from combining certain known elements, discovery of a successful means of combining them is more likely to be nonobvious. (*Id.* at 4 citing *United States v. Adams*, 383 U.S. 39, 51-51 (1966).)

“If the proposed modification or combination of the prior art would change the principle of operation of the prior art invention being modified, then the teachings of the references are not sufficient to render the claims prima facie obvious.” (*In re Ratti*, 270 F.2d 810, 123 USPQ 349 (CCPA 1959). The CCPA has also noted that “[t]he court must be ever alert not to read obviousness into an invention on the basis of the applicant’s own statements; that is, we must view the prior art without reading into that art appellant’s teachings.” *In re Sponnoble*, 160 USPQ 237, 243 (CCPA 1969). These principles have not been changed by the ruling in *KSR*.

2) *Application of § 103 to the Rejected Claims*

The Office asserts that Haitsma teaches “a method of extracting a fingerprint from an audio signal, the method comprising ... extracting a robust set of perceptual features from the audio signal (... A robust property of each band (e.g. energy) is computed (16) ...); [and] subjecting the extracted set of features to a Fourier-Mellin transform to compensate for speed changes in an audio signal ...”. The Office goes on to admit that “Haitsma does not explicitly teach converting the transformed set of features into a sequence constituting a fingerprint.”

The Office proposes to remedy this deficiency with Pareira, which is alleged to teach “converting the magnitudes of the Fourier-Mellin transform ... [which] renders the method

robust against rotation scaling or aspect ratio changes. It would have been obvious ... to include the magnitude algorithm in Fourier transform of Haitisma et al. in order to overcome the sampling problem and maximizing the number of points matched between the known template and the image.” The Applicant respectfully traverses.

A *prima facie* case of obviousness has not been properly established in this case for at least three reasons: (1) Pereira is non-analogous art, (2) those of ordinary skill would not be motivated to combine Haitisma and Pereira, and (3) Pereira does not teach how to apply FFT magnitude processing to Fourier-Mellin transform components. Each of these points will now be explained in detail.

1. Pereira is Non-Analogous Art.

The watermarks created by Pereira are substantially different from the fingerprints that are extracted as part of the claimed subject matter. As a matter of introduction, Pereira describes:

“... an approach for embedding a digital **watermark** into an image using the fast Fourier transform. To this watermark is added a template in the Fourier transform domain to render the method robust against rotations and scaling, or aspect ratio changes.” Pereira, Abstract.

In stark contrast, the claims of the present Application are directed to methods and apparatus used to extract **fingerprints** from an audio signal. The Application notes that:

“Fingerprints, in the literature sometimes referred to as hashes or signatures, are binary sequences extracted from multimedia contents, which can be used to identify said contents. Unlike cryptographic hashes of data files (which change as soon as a single bit of the data file changes), fingerprints of multimedia contents ... are to a certain extent invariant to processing ... This is generally achieved by extracting the fingerprint from perceptually essential features of the contents.” Application, pg. 1, lines 6-12.

In other words, the digital watermarking taught by Pereira, and the fingerprints recited in the claims of the Application, are two different things. Those of ordinary skill in the art realize that embedding identification information into an image, or detection of image rotation and scaling,

have nothing to do with substantive audio signal recognition. As a further distinction, those of ordinary skill in the art also know that watermarking is meant to be imperceptible or nearly imperceptible to the user, whereas fingerprints are extracted from “perceptually essential features of the contents”.

“To Rely on a Reference Under 35 U.S.C. 103, it Must be Analogous Prior Art”.
M.P.E.P. §2141.01(a). “A reference is reasonably pertinent if, even though it may be in a different field from that of the inventor's endeavor, it is one which, because of the matter with which it deals, logically would have commended itself to an inventor's attention in considering his problem.” *In re Clay*, 966 F.2d 656, 659 (Fed. Cir. 1992).” *KSR Int’l Co. v. Teleflex, Inc.*, 127 S. Ct. 1727, 1742 (2007). While “...Patent Office classification of references and the cross-references in the official search notes of the class definitions are some evidence of “nonanalogy” or “analogy” respectively, the court has found “the similarities and differences in structure and function of the inventions to carry far greater weight.” M.P.E.P. §2141.01(a), citing *In re Ellis*, 476 F.2d 1370, 1372, 177 USPQ 526, 527 (CCPA 1973).

Watermarking operates to place selected *foreign* information *into* a medium, whereas fingerprinting extracts *native* information *from* the medium. The information in a watermark can exist independently from the medium which it inhabits; the information that makes up a fingerprint can not. One of ordinary skill in the art would therefore not logically refer to processes in *Pereira* that operate to embed a foreign watermarking code in visual information as a way of solving the problem of extracting fingerprints (derived from native information) that tolerate speed changes in audio material.

Thus, *Pereira*, which operates to embed a watermark in the FFT domain of an image as part of a watermark detection process, is non-analogous art with respect to the claimed embodiments that operate to extract fingerprints from audio signals. *See Pereira*, pg. 1, col. 2. The Applicant therefore respectfully requests withdrawal of the rejection of claims 1-15 under 35 U.S.C. § 103(a) on this basis.

2. Those of Ordinary Skill Would Not be Motivated to Combine *Haitsma* and *Pereira*.

As noted in a prior response, those of ordinary skill would not be motivated to combine Fourier-Mellin transforms with image processing. Certain research results, already presented as

evidence in the record, directly contradict the motivation set forth by the Office for combining the references (i.e., "... it would have been obvious ... to include the magnitude algorithm in Fourier transform of Haitsma et al in order to overcome the sampling problem and maximizing the number of points matched between the known template and the image.)"

These include the discovery by Chen that even when the Fourier-Mellin transform is improved by using FMI-SPOMF (Fourier-Mellin Invariant – Symmetric Phase Only Matched Filtering), the results are poor in applications that use image data. *See* "Symmetric Phase-Only Matched Filtering of Fourier-Mellin Transforms for Image Registration and Recognition," Q. Chen et al., *IEEE Transactions on Pattern Analysis and Machine Intelligence*, vol. 16, no. 12, pp. 1156-1168, December, 1994.

Thus, even when FMI-SPOMG was applied to matching fingerprint images to improve the basic Fourier-Mellin process, Chen noted that the results were "inferior to those observed with the other applications ...". *See* Chen, pg. 1165, Col. 2. These "inferior" results, as stated by Chen, would not lead one of ordinary skill in the art to use the improved version of the Fourier-Mellin transform in conjunction with processing image data, let alone the regular version.

In fact, Chen urges even more strongly, with results supported by his own experimentation, that regular Fourier-Mellin transforms do not provide reliable results with respect to image processing:

"... the cross-correlation of the Fourier-Mellin transforms generally yields a very broad maximum, and this technique is therefore **unreliable** both for the identification and localization of an object in an image. ... the usual cross-correlation method, which we applied in comparison, **did not yield any correct matching** [with respect to visual fingerprint images]." *See* Chen, pg. 1157, col. 1 and pg. 1165, col. 2. (emphasis added)

Thus, the statement by the Office with respect to combining the image processing techniques of Pereira as part of a Fourier-Mellin transform process is not supported by evidence in the record. Therefore, it is improper to combine Pereira with Haitsma.

In addition, since the Office promotes the combination of Haitsma and Pereira against the teachings of the evidence in the record, the Applicant respectfully requests additional evidence to

support the assertions made by the Office, or an affidavit of personal knowledge by the Examiner, pursuant to M.P.E.P. § 2144.03, in the next official communication. Otherwise, there will be no “specific, objective evidence of record for a finding of a suggestion or motivation to combine reference teachings and ... reasoning by which the evidence is deemed to support such a finding.” Therefore, the Applicant respectfully requests withdrawal of the rejection of claims 1-15 under 35 U.S.C. § 103(a) on this basis.

3. *Pereira Does Not Teach How to Apply FFT Magnitude Processing to Fourier-Mellin Transform Components.*

The Office states that “Haitsma does not explicitly teach converting the transformed set of features into a sequence constituting the fingerprint.” The Office goes on to state that “Pereira et al. teaches a step includes [sic] converting the magnitudes of the Fourier-Mellin transform (see section 4.4, magnitude of the FFT, pages 3-5).” However, the Applicant was unable to find anything within the bounds of Pereira that teaches how one should apply the magnitude processing of Pereira within a Fourier-Mellin transformation of an audio signal – so that reliable results would be obtained in the face of speed changes.

For example, it is respectfully noted that the computation of “the magnitude of the FFT” cited by the Office and outlined by Pereira is part of an image processing algorithm. In this algorithm, a square portion of the image is used as input to an FFT magnitude calculation, so that local peaks in the image can be identified. *See* Pereira, section 4.4. This process has nothing to do with audio signal amplitude conversion.

In addition, there is nothing disclosed within the bounds of Pereira that teaches how the problems raised by Chen might be avoided (e.g., , when a Fourier-Mellin transform is used in conjunction with image recognition processes). *See* Chen, pg. 1157, Col. 1. Thus, even if the art did teach how Pereira could be applied to Haitsma, poor results would be expected.

Therefore, Pereira provides no guidance as to how the FFT magnitude calculation, as part of the image processing techniques of Pereira, should be applied to a Fourier-Mellin transform of an audio signal. And even if this teaching were available, the reasonableness of doing so would be questioned by those of ordinary skill in the art. Thus, the Applicant respectfully requests withdrawal of the rejection of claims 1-15 under 35 U.S.C. § 103(a) on this basis.

In summary: (1) Pereira constitutes non-analogous art, (2) those of ordinary skill would not be motivated to combine Haitsma and Pereira, and (3) Pereira does not teach how to apply FFT magnitude processing to Fourier-Mellin transform components. As noted in a prior response, the Applicant respectfully submits that the combination of limitations that form independent claims 1 and 8 yield an unpredictable an unexpected result, namely, compensating for speed changes in an audio signal to provide a speed invariant fingerprint. Since the result of the claimed features is not predictable, and because Chen teaches away from the use of the Fourier-Mellin transform in conjunction with image processing techniques, one of ordinary skill in the art would have no reasonable expectation of success when considering the combination of Haitsma and Pereira.

Therefore, independent claims 1 and 8, reciting the transformation of extracted perceptual features from an audio signal to provide a fingerprint that compensates for speed changes in the audio signal, are nonobvious. In addition, any claim depending from a nonobvious independent claim is also nonobvious. *See* M.P.E.P. § 2143.03. Thus, claims 2-7 and 9-15 should also be nonobvious and in condition for allowance, and the Applicant respectfully requests reconsideration and withdrawal of the rejection of claims 1-15 under 35 U.S.C. § 103(a).

CONCLUSION

It is respectfully submitted that the claims are in condition for allowance, and notification to that effect is earnestly requested. The Examiner is invited to telephone the undersigned at (210) 308-5677 to facilitate prosecution of this Application. If necessary, please charge any additional fees or deficiencies, or credit any overpayments to Deposit Account No. 19-0743.

Respectfully submitted,

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CERTIFICATE UNDER 37 CFR 1.8: The undersigned hereby certifies that this correspondence is being filed using the USPTO's electronic filing system EFS-Web, and is addressed to: Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on this 18 day of December, 2009.

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